MDPI

*Article*

# Outcomes of a Cluster Randomized Controlled Trial of the SoMe Social Media Literacy Program for Improving Body Image-Related Outcomes in Adolescent Boys and Girls

**Chloe S. Gordon [1,2], Hannah K. Jarman [1,*], Rachel F. Rodgers [3,4], Siân A. McLean [1], Amy Slater [5], Matthew Fuller-Tyszkiewicz [6,7] and Susan J. Paxton [1]**

1   School of Psychology and Public Health, La Trobe University, Melbourne, VIC 3086, Australia; chloe.gordon@acu.edu.au (C.S.G.); s.mclean@latrobe.edu.au (S.A.M.); susan.paxton@latrobe.edu.au (S.J.P.)
2   ACU Engagement, Australian Catholic University, Melbourne, VIC 3002, Australia
3   APPEAR, Department of Applied Psychology, Northeastern University, Boston, MA 02115, USA; r.rodgers@northeastern.edu
4   Department of Psychiatric Emergency & Acute Care, Lapeyronie Hospital, CHRU Montpellier, 34090 Montpellier, France
5   Centre for Appearance Research, University of West of England, Bristol BS16 1QY, UK; amy.slater@uwe.ac.uk
6   School of Psychology, Deakin University, Geelong, VIC 3220, Australia; matthew.fuller-tyszkiewicz@deakin.edu.au
7   Centre for Social and Early Emotional Development, School of Psychology, Deakin University, Melbourne, VIC 3125, Australia
*   Correspondence: h.jarman@latrobe.edu.au; Tel.: +61-9479-3879

check for updates

**Abstract:** Although the negative effect of social media use among youth on body image and eating concerns has been established, few classroom-based resources that can decrease these effects through targeting social media literacy skills have been developed. This study aimed to test the efficacy of SoMe, a social media literacy body image, dieting, and wellbeing program for adolescents, through a cluster randomized controlled trial. Participants ($n = 892$; $M_{age} = 12.77$, $SD = 0.74$; range 11–15; 49.5% male) were randomized by school ($n = 8$) to receive either weekly SoMe ($n = 483$) or control sessions (lessons as usual; $n = 409$) over 4 weeks in their classroom. Participants completed surveys at four timepoints (baseline, 1-week post-intervention, and 6- and 12-month follow-up) assessing body dissatisfaction, dietary restraint, strategies to increase muscles (primary outcomes), self-esteem and depressive symptoms (secondary outcomes), and internalization of appearance ideals and appearance comparison (exploratory outcomes). Modest positive intervention effects were found in dietary restraint and depressive symptoms at 6-month follow-up in girls but few positive effects emerged for boys. The findings provide only preliminary support for a social media literacy intervention, but suggest the usefulness of both identifying those who benefit most from a universally delivered intervention and the need to refine the intervention to maximize intervention effects.

**Keywords:** body image; dietary restraint; wellbeing; social media; RCT; adolescents; eating disorders; school-based prevention

## 1. Introduction

Eating disorders are serious mental illnesses that have long-lasting psychological, physical, and economic implications [1,2]. Concerningly, eating disorders are becoming increasingly prevalent [3]. Among the most well-established risk factors for eating disorder onset are body dissatisfaction and dieting behaviors [4]. High levels of body dissatisfaction are reported by adolescents, with one study identifying 42.8% and 14.5% of adolescent girls and boys, respectively, are "extremely" or "very" concerned about their body image [5]. In early adolescents, 19.6% and 6.8% of girls and boys, respectively, reported clinically significant levels of body dissatisfaction [6]. Dieting behaviors are also commonly reported.

One study found a very high proportion of adolescents reported having ever engaged in a muscularity-orientated behavior (e.g., lift weights, drink protein shakes) and a little under half in restrictive and binging behaviors [7].

High rates of body dissatisfaction among adolescents are concerning not only due to their potential to predict eating disorder onset but also to predict an array of adverse outcomes, including poor quality of life, psychological distress [8], low self-esteem and depressive symptoms [9–11], use of unhealthy body change behaviors [12,13], and health risk behaviors [14,15]. In view of these negative health outcomes, the need for prevention of body dissatisfaction and dieting to interrupt the pathway to further disorders has been emphasized [16–18]. As a result, the identification of effective prevention strategies to reduce body dissatisfaction and related body change activities in adolescents is recognized as a vital area of research [16,17].

### 1.1. The Social Media Environment

According to sociocultural theory, three key sociocultural influences impact the development and maintenance of body dissatisfaction: media, parents, and peers [19], with media being identified as one of the most pervasive and salient [20]. With advancements in technology over the last two decades, time spent on digital media (e.g., social media) has now surpassed that of traditional media among adolescents [21]. Social media refers to online platforms that allow the user to create their own profiles and to interact, share, and view content online with others [22]. Social media is especially popular among adolescents, with 85% of adolescents reportedly having a social media account [23]. Adolescents report spending approximately 3 h per day on social media, with scholars labeling social media as a "pervasive and salient developmental context in the daily lives of early adolescents" [24].

Social media provides a unique peer and media environment that enhances pressures to conform to appearance ideals, thereby increasing body dissatisfaction. Much of the content on social media is appearance-focused, typically presenting and reinforcing appearance-ideals [25]. The asynchronicity of social media allows time for careful curating and editing of images before posting online, facilitating a focus on appearance and self-presentation [26]. Social media is also an interactive environment, which allows users to provide and receive feedback. Adolescents report seeking appearance-related comments as a means of validation [27], yet receiving appearance-related commentary on social media has been found to be related to negative body image and restrained eating [28]. Furthermore, social media facilitates widespread opportunities for social comparison, and, given the salience of appearance-related idealized content online, these comparisons typically result in negative appearance self-evaluations [29]. Together, these factors contribute to the influence of social media on body image.

Reviews of cross-sectional research have consistently found higher social media use to be related to higher body dissatisfaction [30–32]. In addition, longitudinal evidence suggests a direct effect from social media use to body dissatisfaction [33] as well as the existence of indirect effects through appearance comparisons [34,35]. Experimental research consistently finds that exposure to idealized social media images, as well as the creation of self-images, results in increased body dissatisfaction [36–38]. Thus, a robust body of evidence has supported the pathways outlined by sociocultural theories accounting for the detrimental effects of social media use on body image and the role of idealized self-images.

### 1.2. Body Image Interventions

Given the negative impact of idealized social media images on adolescent body image, it is essential to develop and evaluate interventions to counteract this influence. Schools offer appropriate settings for such efforts, with opportunities for high reach of the target population at low cost [39]. A review of school-based body image interventions found that programs were particularly effective among young adolescents (12–13 years) [40]. While girls report higher social media use (i.e., Instagram) than boys, both boys and girls experience appearance pressures on social media and concerns regarding negative

appearance evaluation by others [41]. As the relationships between social media use and body satisfaction appear somewhat consistent among adolescent boys and girls [31,42] and there are practical advantages of co-educational delivery, co-educational schools appear to be appropriate settings for interventions.

While limited work has focused on interventions to address the social media environment, a number of interventions exist that have successfully targeted traditional media and peer influences and, therefore, lay useful groundwork for interventions targeting social media effects. Indeed, effective school-based body image interventions typically include health literacy components, namely media literacy [40]. Health literacy refers to skills and capabilities that facilitate understanding and application of health information to improve health and wellbeing [43]. Within this vein, media literacy refers to having skills to evaluate and critically analyze media content. In theory, a more critical appraisal of unrealistic and idealized images reduces their credibility and relevance to the individual, limiting the negative impact of viewing the images [44]. Media literacy interventions have shown effectiveness in improving a range of body image-related outcomes, including the internalization of appearance ideals and weight and shape concerns [45–48]. Interventions that contain some elements of media literacy have also shown promise in improving body image and reducing internalization of appearance ideals among adolescents [49–53].

### 1.3. Social Media Literacy

Despite their potential, media literacy programs to improve body image are typically limited in their focus to traditional media [47,48,51], which is currently declining in use among this age group [21]. In response to this, an emerging area of research is the examination of the protective role of social media literacy, which refers to skills of critical evaluation of the motives of users' social media activities. These include that of commercial interests, peers, and celebrities, and presentation practices to present oneself favorably such as picture selection and editing [53]. In support of its protective role in relation to the impact of social media on body image, experimental research has found that commercial social media literacy mitigated the negative effects of exposure to appearance-focused social media content among young adult women, although these findings were not replicated among men [54].

Social media literacy interventions focus on developing social media literacy skills and teach strategies to challenge personal reactions to exposure to social media, including internalization of appearance ideals and social comparison [53]. To date, only a small number of interventions with a primary focus on building social media literacy to reduce body dissatisfaction and disordered eating among adolescents have been evaluated [53,55]. The first, BOOST, was a three-session intervention for Australian adolescent girls aimed at teaching skills to challenge advertising and images presented by social media [53]. In this small, non-randomized study, compared to the control group, those who received the intervention showed improvements in body esteem, dietary restraint, and media literacy from baseline to post-intervention. More recently, Digital Bodies, a single-session body image intervention, which aims to target appearance pressures within the social media environment, has also shown promising findings in the United Kingdom [55]. Adolescents in the intervention group reported improvements in body satisfaction at post-intervention and 8-week follow-up relative to controls. Furthermore, in girls, a reduction in thin-ideal internalization was found at post-intervention in the intervention compared to control group. With preliminary support, it appears that social media literacy interventions may reduce the negative impact of social media use on body image-related outcomes among adolescents. However, these studies were limited by their brief (or lack of) follow-up assessments, and only one [55] included adolescent boys. Consequently, further research is needed to examine the efficacy of a social media literacy intervention among adolescent boys as well as girls within a co-educational setting over an extended period of time in a randomized controlled trial (RCT) design.

*1.4. The Present Study*

Consistent with our protocol [56], the aim of the current research was to evaluate the efficacy of SoMe in improving adolescents' body image-related outcomes and wellbeing. We hypothesized that participants receiving SoMe would report decreased body dissatisfaction, dietary restraint, and strategies to increase muscles (primary outcome variables), and elevated self-esteem and reduced depressive symptoms (secondary outcomes) one-week post-intervention and from baseline to 6- and 12-months, compared to the no-intervention control group. In addition, change within the intervention group was hypothesized to occur through reduced internalization of appearance ideals and appearance comparison (exploratory outcomes).

## 2. Materials and Methods

*2.1. Study Design*

A two-arm cluster RCT design was used to investigate how social media literacy mitigates the negative impact of social media use in adolescents. Eight schools in Victoria, Australia, of which five were public and three independent, participated in this research. Participants completed a structured self-report questionnaire, which was administered in classroom sessions on four occasions: at baseline (pre-intervention); one-week post-intervention (5-weeks post-baseline); and 6- and 12-months post-baseline. This trial was registered with the Australian New Zealand Clinical Trials Registry (ACTRN12617000137392; www.anzctr.org.au; accessed on 25 January 2017). Further detail on the study rationale and design can be found in the protocol paper [56]. A priori power analysis revealed that a proposed sample size of 350 boys and 350 girls, allowing for 30% attrition, would have sufficient power to detect small to medium effects ($d = 0.30$) between groups.

*2.2. Participants*

Participants were Grade 7 and Grade 8 students (11–15 years of age) attending school in November 2017–August 2019. If their grade was selected to receive SoMe, all students in the grade received the 4-lesson program as part of their school curriculum. However, only students whose parents provided consent were eligible to participate in the research. Most schools required written active parental consent ($n = 6$), while two schools used informed, opt-out parental consent whereby parents could actively choose to withdraw their child from the research. Both consent options were in accordance with ethics approval. A total of 892 participants completed at least one survey over the four timepoints ($n = 775$ at baseline, $n = 740$ at post-intervention, $n = 700$ at 6-month follow-up, and $n = 685$ at 12-month follow-up). At baseline, the average age of participants was 12.77 years ($SD = 0.74$; range 11–15), with 49.5% identifying as male, 49.0% as female, and 1.5% reporting 'other'/'I would prefer not to respond'. The majority of participants (84.21%) were born in Australia or New Zealand, 8.00% in East and Southeast Asia, and 3.61% in European countries. A small number of participants were born in other countries (4.18%). Participants also reported that their parents were primarily born in Australia or New Zealand (mothers 63.32%; fathers 62.62%), as well as East and Southeast Asia (mothers 18.89%; fathers 17.66%), European countries (mothers 9.65%; fathers 10.48%), or elsewhere (mothers 8.15%; fathers 9.24%). Participants primarily lived in areas of low-relative disadvantage (81.01%), with lower rates in mid- (8.31%) and high-relative disadvantage (10.68%) [57]. Grade levels within schools were randomly assigned to receive either SoMe ($n = 483$) or the control condition, health lessons as usual ($n = 409$).

*2.3. Intervention*

SoMe (a social media literacy body image, dieting, and wellbeing program for early high school students) consisted of four 50-min lessons. It was underpinned by an aetiological perspective, which proposes that a reduction in causal risk factors or increase in protective factors for a problem will disrupt the developmental sequence, resulting in a reduced likelihood that the problem will develop [58]. The tripartite influence model

and supporting empirical research indicates a negative impact of exposure to appearance-focused media on body image [19,32]. Based on this, SoMe endeavored to provide early adolescents with critical social media literacy skills to counteract detrimental effects of social media exposure.

Grounded in media literacy principles [59] and constructivist learning theory [60], the lessons were experiential and interactive, and aimed to empower adolescents with skills to critique social media postings, including advertising, celebrity postings, and friends' personal pages. Students considered realism in social media, developed strategies to respond to negative feedback, explored how social media can be used to bring about positive social change, and importantly, reflected on and practiced how to present their 'real' selves on social media with less emphasis placed on appearance. The intervention was delivered by trained facilitators who each received two half-day training workshops run by one of the authors who developed the intervention. In addition, each facilitator observed a session of the intervention being delivered by one of the authors. Finally, facilitator manuals were used to ensure consistency in lesson delivery across classes. For further detail on the program's theoretical basis, development, and structure and content, including a summary of the intervention's objectives and learning experiences, see [56].

*2.4. Measures*

Demographic data were obtained, including gender, age, country of birth, language spoken at home, and residential postcode. Primary, secondary, and exploratory outcomes and their internal reliability are outlined in Table 1. These measures have previously shown good validity and reliability in adolescent samples, details of which are presented elsewhere [56].

**Table 1.** Overview of the instruments used to evaluate the efficacy of the SoMe intervention.

| | Outcome Measures | Construct | Cronbach Alpha |
|---|---|---|---|
| Primary outcome variables | 12-item Weight and Shape Concern subscales of the Eating Disorder Examination Questionnaire (EDE-Q) [61] e.g., "Have you had a strong desire to lose weight?" | Body dissatisfaction | 0.96 |
| | Three 100-point visual analogue scales (VAS) [62] e.g., "I feel satisfied with my body shape" | State body dissatisfaction | - |
| | 10-item Restraint subscale from the Dutch Eating Behaviour Questionnaire (DEBQ) [63] e.g., "Do you deliberately eat foods that are slimming?" | Dietary restraint | 0.94 |
| | 5-item Strategies to Increase Muscle Size subscale from the Body Change Inventory (BCI) [64] e.g., "How often do you think about changing your level of exercise to increase the size of your muscles?" | Strategies to increase muscles | 0.92 |
| Secondary outcome variables | 9-items from the Centre for Epidemiological Studies Depression Scale Revised (CESDR-10) [65] e.g., "I had trouble keeping my mind on what I was doing" | Depressive symptoms | 0.90 |
| | Single-item Self-Esteem Scale [66] 3-items from the Rosenberg Self-Esteem Scale [67] e.g., "I feel I have a number of good qualities" | Self-esteem | 0.71 |
| Exploratory outcome variables | 5-items (adapted) from The Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3) [68] e.g., "I would like my body to look like people on social media" | Internalization of social media appearance ideals | 0.81 |
| | 5-item Internalization-Muscular/Athletic Subscale of the Sociocultural Attitudes Towards Appearance Scale-4 (SATAQ-4) [69] e.g., "It is important for me to look athletic" | Internalization of muscular/athletic ideals | 0.93 |
| | 5-items from the Upward Physical Appearance Comparison Scale (UPACS) [70] e.g., "I tend to compare myself to people I think look better than me" | Upward appearance comparison | 0.97 |

Internal reliability of scale scores is represented by baseline measurement.

*2.5. Procedure*

The research protocol was approved by the La Trobe University Human Ethics Committee (HEC17-020) and the Victorian Department of Education and Training (2017_003388). Blocked randomization was conducted using an online program. Grade 7 and 8 cohorts within each participating school were randomly assigned to one of two conditions: intervention or control. Participants in the intervention condition received four lessons delivered during class time over 4 weeks while the control condition received lessons as usual. All participants were invited to complete questionnaires at baseline (pre-intervention); one-week post-intervention (5-week post-baseline); and 6- and 12-month post-baseline. Data collections were completed during class time, facilitated by a member of the research team alongside supervision from the class teacher. Figure 1 shows participant flow.
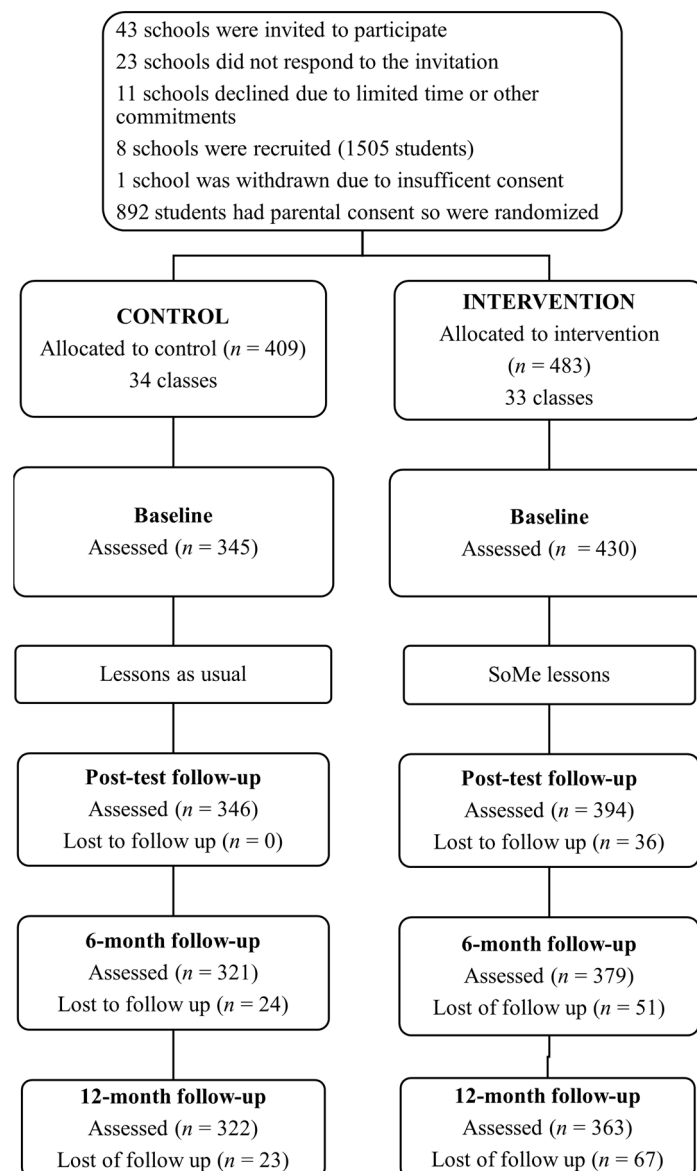


**Figure 1.** Summary of participant flow.

### *2.6. Statistical Analysis*

Data screening and preliminary analyses were conducted in SPSS version 27. Outcome variables were screened for missing values, outliers, and normality. Scale scores were marked as missing for adolescents who responded to less than 70% of items on a scale.

The main analyses were undertaken using Stata version 16 and conducted on an intention-to-treat basis, with participant data included as per initial intervention group allocation. Linear mixed models were used for all outcome measures, with repeated measurements clustered within individuals. While the study protocol had indicated that internalization of appearance ideals and appearance comparison would mediate changes in outcome variables in the intervention group [56], few significant intervention effects were found. As the intervention aimed to reduce these variables originally indicated as mediating variables, the authors decided to run exploratory analyses with these as outcome variables, as per the main analyses. The final outcome measures were body dissatisfaction, dietary restraint, and strategies to increase muscles (primary outcome variables), self-esteem and depressive symptoms (secondary outcomes), and internalization of appearance ideals and appearance comparison (exploratory outcomes).

Time effects were coded as comparisons between the baseline measurements and all subsequent measurements (i.e., baseline vs. post-intervention, baseline vs. 6-months, baseline vs. 12-months) and were treated as random effects to facilitate evaluation of moderation effect of time by group. An unstructured covariance matrix was applied to most accurately model covariances among these random effects. Preliminary testing was conducted to evaluate clustering effects of school, but all random effects for school were close to zero, and in some instances failed to converge. Accordingly, no adjustment for school was applied in the final analyses.

Analyses were run on the full sample, followed by evaluation of individuals who completed the study ("completers", operationalized as data provided at all waves) and subgroup analyses for boys and girls. Models are reported in adjusted form, using demographic variables as covariates if identified as differing at baseline between groups. As the research hypotheses address different segments of the overall sample (full sample; completers; boys; girls), models may differ in the covariates included-adjustment variables are identified in relevant tables of results. Effect sizes are reported as standardized mean differences, with values of 0.20 considered small, 0.50 moderate, and 0.80 and above considered large [71]. Across all variables, the amount of missing data ranged from 0 to 26%. Therefore, missing data were handled using multiple imputations (MI) with 50 imputations in all models.

## 3. Results

### *3.1. Preliminary Analyses*

Table 2 presents group differences in baseline characteristics. Participants in the control group were significantly younger, less likely to come from public schools, and less likely to report English as their primary language spoken at home. No differences between groups were found for BMI, gender distribution, Indigenous status, or whether participants completed all surveys.

### *3.2. Intervention Efficacy*

#### 3.2.1. Full Sample

Table 3 shows intervention effects for the full sample, adjusting for age, language, and school type. The only outcome measure to show different rates of change across groups was drive for increased muscularity ($d$ = 0.19). Although there was a decline in drive for muscularity from baseline to 12-month follow-up for the sample overall ($b$ = $-1.31$, $p < 0.001$), unexpectedly, this decline was weaker for individuals in the intervention arm of the study.

**Table 2.** Demographic differences at baseline between intervention and control groups.

| | Intervention | | Control | | Difference | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *t* | *p*-Value |
| Age | 12.768 | 0.571 | 12.648 | 0.853 | −2.08 | 0.038 |
| BMI | 18.997 | 2.617 | 19.210 | 2.681 | 0.44 | 0.662 |
| | *n* | % | *n* | % | $x^2$ | *p*-value |
| Completers: | | | | | 0.610 | 0.435 |
|   Yes | 259 | 53.63 | 230 | 56.23 | | |
|   No | 224 | 46.38 | 179 | 43.77 | | |
| School type: | | | | | 25.65 | <0.001 |
|   Independent | 145 | 55.98 | 160 | 69.57 | | |
|   Public | 114 | 44.02 | 70 | 30.43 | | |
| Gender: | | | | | 1.29 | 0.732 |
|   Male | 129 | 49.81 | 108 | 46.96 | | |
|   Female | 128 | 49.42 | 117 | 50.87 | | |
|   Other | 2 | 0.77 | 3 | 1.30 | | |
| Prefer not to respond | 0 | 0 | 2 | 0.87 | | |
| Primary language spoken at home: | | | | | 15.59 | 0.001 |
|   English | 210 | 81.08 | 197 | 85.65 | | |
|   Other | 37 | 14.29 | 24 | 10.43 | | |
|   English and other | 9 | 3.47 | 7 | 3.04 | | |
|   Not specified | 3 | 1.16 | 2 | 0.87 | | |
| Indigenous background: | | | | | 3.42 | 0.332 |
|   Aboriginal | 1 | 0.39 | 2 | 0.87 | | |
|   Torres Strait Islander | 2 | 0.77 | 1 | 0.43 | | |
|   No | 256 | 98.84 | 227 | 98.70 | | |

**Table 3.** Mean changes in study variables at post-intervention and 6- and 12-month follow-up for main analyses.

| | Study Group | | | | Difference in Change Score (Group 1—Group 0) | | |
|---|---|---|---|---|---|---|---|
| | Control | | Intervention | | | | |
| Outcome | *n* | M (SD) | *n* | M (SD) | M [95% CI] | Effect Size | *p* (Two-Tailed) |
| **Primary and secondary outcomes** | | | | | | | |
| Weight/shape concerns | | | | | | | |
|   Baseline | 343 | 1.68 (1.70) | 418 | 1.59 (1.65) | | | |
|   Post-intervention | 342 | 1.56 (1.64) | 387 | 1.47 (1.62) | 0.00 [−0.16, 0.17] | 0.00 | 0.998 |
|   6-month follow-up | 316 | 1.67 (1.67) | 373 | 1.68 (1.70) | 0.08 [−0.12, 0.27] | 0.047 | 0.449 |
|   12-month follow-up | 319 | 1.85 (1.75) | 361 | 1.76 (1.65) | 0.05 [−0.17, 0.26] | 0.029 | 0.656 |
| State body satisfaction | | | | | | | |
|   Baseline | 342 | 64.20 (31.97) | 418 | 64.96 (32.02) | | | |
|   Post-intervention | 342 | 65.17 (32.53) | 387 | 67.75 (30.69) | 1.54 [−1.90, 4.97] | 0.048 | 0.381 |
|   6-month follow-up | 316 | 66.16 (31.71) | 373 | 67.10 (30.78) | 0.09 [−3.66, 3.83] | 0.002 | 0.963 |
|   12-month follow-up | 318 | 62.21 (31.98) | 358 | 65.68 (30.70) | 2.03 [−2.27, 6.32] | 0.063 | 0.355 |
| Dietary restraint | | | | | | | |
|   Baseline | 341 | 1.95 (0.97) | 424 | 1.96 (1.00) | | | |
|   Post-intervention | 341 | 1.81 (0.97) | 388 | 1.82 (0.96) | 0.03 [-.008, 0.13] | 0.030 | 0.633 |
|   6-month follow-up | 316 | 1.92 (1.04) | 374 | 1.87 (0.97) | −0.06 [−0.20, 0.07] | −0.060 | 0.334 |
|   12-month follow-up | 316 | 1.95 (1.04) | 361 | 1.90 (1.01) | 0.03 [−0.11, 0.18] | 0.030 | 0.650 |
| Drive to increase muscularity | | | | | | | |
|   Baseline | 341 | 11.23 (5.33) | 423 | 11.05 (5.54) | | | |
|   Post-intervention | 343 | 10.38 (5.35) | 386 | 10.26 (5.31) | 0.17 [−0.45, 0.78] | 0.031 | 0.596 |
|   6-month follow-up | 319 | 10.48 (5.31) | 374 | 10.56 (5.16) | 0.45 [−0.32, 1.21] | 0.082 | 0.254 |
|   12-month follow-up | 319 | 10.24 (5.22) | 360 | 10.56 (5.01) | 1.01 [0.16, 1.87] | 0.185 | 0.020 |
| Self-esteem | | | | | | | |
|   Baseline | 340 | 11.09 (3.06) | 415 | 10.86 (2.80) | | | |
|   Post-intervention | 339 | 11.31 (3.00) | 383 | 10.81 (3.03) | −0.16 [−0.52, 0.20] | −0.054 | 0.376 |
|   6-month follow-up | 319 | 10.88 (2.99) | 370 | 10.87 (3.11) | 0.22 [−0.20, 0.65] | 0.075 | 0.305 |
|   12-month follow-up | 314 | 10.69 (3.24) | 358 | 10.62 (3.07) | 0.18 [−0.30, 0.65] | 0.061 | 0.464 |
| Depressive symptoms | | | | | | | |
|   Baseline | 337 | 16.28 (7.51) | 418 | 15.91 (7.52) | | | |
|   Post-intervention | 341 | 16.06 (7.50) | 388 | 16.20 (8.05) | 0.30 [−0.61, 1.22] | 0.039 | 0.515 |
|   6-month follow-up | 319 | 17.35 (8.60) | 372 | 16.42 (8.10) | −0.73 [−1.78, 0.33] | −0.097 | 0.177 |
|   12-month follow-up | 316 | 17.79 (8.59) | 357 | 18.13 (8.38) | 0.90 [−0.22, 2.02] | 0.119 | 0.115 |

**Table 3.** *Cont.*

| Outcome | n | Study Group Control M (SD) | n | Intervention M (SD) | Difference in Change Score (Group 1—Group 0) M [95% CI] | Effect Size | p (Two-Tailed) |
|---|---|---|---|---|---|---|---|
| Exploratory outcomes | | | | | | | |
| Thin ideal internalization | | | | | | | |
| Baseline | 342 | 11.61 (5.19) | 424 | 12.00 (5.13) | | | |
| Post-intervention | 340 | 11.81 (5.02) | 388 | 11.97 (4.70) | −0.11 [−0.73, 0.50] | −0.021 | 0.722 |
| 6-month follow-up | 315 | 12.44 (5.10) | 374 | 11.91 (4.99) | −0.67 [−1.38, 0.04] | −0.130 | 0.063 |
| 12-month follow-up | 317 | 12.58 (5.19) | 358 | 12.58 (4.88) | −0.10 [−0.78, 0.58] | −0.019 | 0.771 |
| Muscular internalization | | | | | | | |
| Baseline | 341 | 11.81 (5.66) | 427 | 11.42 (5.31) | | | |
| Post-intervention | 343 | 11.28 (5.76) | 389 | 10.97 (5.32) | −0.14 [−0.81, 0.52] | −0.026 | 0.671 |
| 6-month follow-up | 318 | 11.65 (5.67) | 374 | 11.55 (5.60) | 0.25 [−0.52, 1.02] | 0.046 | 0.52 |
| 12-month follow-up | 318 | 11.58 (5.73) | 359 | 11.84 (5.56) | 0.71 [−0.14, 1.56] | 0.130 | 0.100 |
| Upwards appearance comparison | | | | | | | |
| Baseline | 341 | 11.81 (6.66) | 422 | 11.24 (6.35) | | | |
| Post-intervention | 339 | 11.36 (6.61) | 389 | 11.27 (6.15) | 0.53 [−0.18, 1.24] | 0.082 | 0.142 |
| 6-month follow-up | 318 | 12.29 (6.88) | 372 | 11.64 (6.43) | −0.04 [−0.89, 0.81] | −0.006 | 0.925 |
| 12-month follow-up | 317 | 12.73 (6.83) | 359 | 12.15 (6.60) | 0.34 [−0.59, 1.28] | 0.052 | 0.468 |

Effects are based on multiple imputations (*n* = 50 imputations). Differences compare post-intervention to all other timepoints, adjusted for age, language, and school type.

### 3.2.2. Completers

As shown in Supplementary Table S1, a similar pattern emerged when the sample was limited to study completers. Contrary to expectations, controlling for school type, the decline in drive for muscularity from baseline to the 12-month follow-up was weaker for individuals in the intervention group relative to the control condition (*d* = 0.27).

### 3.2.3. Girls

Two significant group-by-time effects emerged when models were run separately for girls—see Table 4. First, whereas the control group slightly increased in dietary restraint from baseline to the 6-month follow-up, the intervention group exhibited reduced symptoms (*d* = 0.24). Second, increases in depressive symptoms experienced for the sample overall from baseline to the 6-month follow-up were weaker for girls in the intervention arm than the control arm (*d* = 0.22).

### 3.2.4. Boys

Three significant group-by-time effects were observed for boys—see Table 5. First, whereas dietary restraint behaviors reduced from baseline to the 12-month follow-up for both groups, unexpectedly, this effect was weaker for the intervention arm (*d* = 0.23). Second, contrary to expectations, the intervention group exhibited an increase in drive for muscularity from baseline to the 12-month follow-up, while the control group showed a decline in this behavior (*d* = 0.29). Third, as predicted, the intervention group showed an increase in self-esteem from baseline to the 6-month follow-up, whereas self-esteem scores declined for the control group (*d* = 0.29).

**Table 4.** Mean changes in study variables at post-intervention and 6- and 12-month follow-up for girls only.

| | | Study Group | | | Difference in Change Score (Group 1—Group 0) | | |
|---|---|---|---|---|---|---|---|
| | | Control | | Intervention | | | |
| Outcome | *n* | M (SD) | *n* | M (SD) | M [95% CI] | Effect Size | *p* (Two-Tailed) |
| **Primary and secondary outcomes** | | | | | | | |
| Weight/shape concerns | | | | | | | |
| Baseline | 174 | 2.12 (1.76) | 196 | 2.05 (1.81) | | | |
| Post-intervention | 172 | 2.06 (1.77) | 182 | 1.77 (1.68) | −0.20 [−0.43, 0.02] | −0.112 | 0.074 |
| 6-month follow-up | 157 | 2.23 (1.79) | 191 | 2.15 (1.84) | −0.02 [−0.29, 0.25] | −0.011 | 0.864 |
| 12-month follow-up | 162 | 2.56 (1.79) | 165 | 2.41 (1.70) | −0.08 [−0.41, 0.25] | −0.045 | 0.637 |
| State body satisfaction | | | | | | | |
| Baseline | 173 | 57.42 (31.74) | 195 | 60.47 (32.50) | | | |
| Post-intervention | 172 | 58.15 (33.14) | 181 | 64.36 (30.94) | 2.74 [−1.73, 7.21] | 0.085 | 0.229 |
| 6-month follow-up | 158 | 57.44 (31.54) | 192 | 60.78 (32.48) | 0.53 [−4.95, 6.00] | 0.016 | 0.850 |
| 12-month follow-up | 162 | 51.21 (30.38) | 164 | 57.73 (32.10) | 2.89 [−3.32, 9.10] | 0.090 | 0.361 |
| Dietary restraint | | | | | | | |
| Baseline | 173 | 2.05 (1.01) | 202 | 2.13 (1.09) | | | |
| Post-intervention | 172 | 1.93 (1.01) | 183 | 1.90 (0.98) | −0.11 [−0.25, 0.03] | −0.104 | 0.111 |
| 6-month follow-up | 157 | 2.10 (1.10) | 192 | 1.97 (1.02) | −0.25 [−0.42, −0.07] | −0.237 | 0.005 |
| 12-month follow-up | 160 | 2.26 (1.12) | 165 | 2.18 (1.09) | −0.13 [−0.34, 0.07] | −0.123 | 0.209 |
| Drive to increase muscularity | | | | | | | |
| Baseline | 173 | 10.53 (4.77) | 200 | 10.92 (5.67) | | | |
| Post-intervention | 174 | 9.84 (4.76) | 181 | 9.65 (5.06) | −0.45 [−1.31, 0.41] | −0.085 | 0.305 |
| 6-month follow-up | 160 | 9.81 (4.62) | 192 | 10.01 (5.06) | −0.13 [−1.04, 0.78] | −0.025 | 0.781 |
| 12-month follow-up | 162 | 9.62 (4.25) | 165 | 9.87 (4.81) | 0.22 [−0.86, 1.30] | 0.042 | 0.695 |
| Self-esteem | | | | | | | |
| Baseline | 174 | 10.57 (3.15) | 197 | 10.66 (2.93) | | | |
| Post-intervention | 172 | 10.90 (3.10) | 183 | 10.52 (3.24) | −0.35 [−0.84, 0.14] | −0.115 | 0.157 |
| 6-month follow-up | 160 | 10.69 (2.96) | 192 | 10.55 (3.15) | −0.18 [−0.73, 0.37] | −0.059 | 0.516 |
| 12-month follow-up | 161 | 9.99 (3.16) | 164 | 10.18 (3.07) | 0.05 [−0.60, 0.71] | 0.016 | 0.873 |
| Depressive symptoms | | | | | | | |
| Baseline | 172 | 17.50 (7.85) | 199 | 17.02 (8.32) | | | |
| Post-intervention | 172 | 16.91 (7.26) | 184 | 16.95 (8.37) | 0.08 [−1.18, 1.33] | 0.010 | 0.905 |
| 6-month follow-up | 160 | 19.54 (9.10) | 192 | 17.73 (8.58) | −1.77 [−3.43, −0.10] | −0.218 | 0.038 |
| 12-month follow-up | 162 | 19.85 (8.80) | 164 | 19.79 (8.87) | 0.74 [−0.98, 2.47] | 0.091 | 0.398 |
| **Exploratory outcomes** | | | | | | | |
| Thin ideal internalization | | | | | | | |
| Baseline | 174 | 12.60 (5.41) | 201 | 12.88 (5.50) | | | |
| Post-intervention | 172 | 12.49 (5.37) | 183 | 12.60 (4.82) | −0.16 [−0.98, 0.65] | −0.029 | 0.694 |
| 6-month follow-up | 157 | 13.27 (5.31) | 192 | 12.73 (5.28) | −0.76 [−1.72, 0.20] | −0.139 | 0.119 |
| 12-month follow-up | 161 | 14.12 (5.04) | 164 | 13.60 (4.96) | −0.62 [−1.62, 0.37] | −0.114 | 0.220 |
| Muscular internalization | | | | | | | |
| Baseline | 173 | 10.84 (5.26) | 203 | 10.60 (5.00) | | | |
| Post-intervention | 173 | 10.53 (5.24) | 183 | 9.94 (4.78) | −0.54 [−1.34, 0.27] | −0.105 | 0.192 |
| 6-month follow-up | 159 | 10.81 (5.02) | 192 | 10.60 (5.20) | −0.07 [−1.08, 0.94] | −0.014 | 0.896 |
| 12-month follow-up | 162 | 11.18 (5.19) | 165 | 10.98 (5.19) | 0.05 [−1.11, 1.21] | 0.010 | 0.932 |
| Upwards appearance comparison | | | | | | | |
| Baseline | 173 | 13.99 (6.76) | 202 | 12.89 (6.72) | | | |
| Post-intervention | 170 | 13.08 (6.89) | 183 | 12.42 (6.49) | 0.37 [−0.64, 1.38] | 0.055 | 0.470 |
| 6-month follow-up | 159 | 14.33 (7.05) | 191 | 13.28 (6.58) | −0.25 [−1.46, 0.95] | −0.037 | 0.677 |
| 12-month follow-up | 161 | 15.44 (6.66) | 165 | 14.32 (6.76) | −0.01 [−1.34, 1.31] | −0.001 | 0.988 |

Effects are based on multiple imputations (*n* = 50 imputations). Differences compare post-intervention to all other timepoints, adjusted for age, language, and school type.

**Table 5.** Mean changes in study variables at post-intervention and 6- and 12-month follow-up for boys only.

| | | Study Group | | | Difference in Change Score (Group 1—Group 0) | | |
|---|---|---|---|---|---|---|---|
| | | Control | | Intervention | | | |
| Outcome | *n* | M (SD) | *n* | M (SD) | M (95% CI) | Effect Size | *p* (Two-Tailed) |
| **Primary and secondary outcomes** | | | | | | | |
| Weight/shape concerns | | | | | | | |
| Baseline | 163 | 1.15 (1.41) | 217 | 1.14 (1.35) | | | |
| Post-intervention | 165 | 1.03 (1.29) | 202 | 1.20 (1.52) | 0.18 [−0.04, 0.41] | 0.131 | 0.116 |
| 6-month follow-up | 153 | 1.10 (1.31) | 179 | 1.18 (1.37) | 0.14 [−0.10, 0.38] | 0.102 | 0.261 |
| 12-month follow-up | 150 | 1.05 (1.28) | 193 | 1.19 (1.38) | 0.19 [−0.08, 0.46] | 0.138 | 0.160 |
| State body satisfaction | | | | | | | |
| Baseline | 163 | 71.44 (30.33) | 217 | 69.34 (30.89) | | | |
| Post-intervention | 165 | 72.43 (30.19) | 203 | 70.73 (30.22) | −0.23 [−5.52, 5.05] | −0.008 | 0.932 |
| 6-month follow-up | 152 | 75.26 (29.19) | 178 | 73.92 (27.39) | −0.66 [−6.46, 5.14] | −0.022 | 0.823 |
| 12-month follow-up | 149 | 74.35 (29.03) | 191 | 72.75 (27.44) | −0.31 [−6.56, 5.94] | −0.010 | 0.922 |
| Dietary restraint | | | | | | | |
| Baseline | 162 | 1.82 (0.88) | 216 | 1.79 (0.88) | | | |
| Post-intervention | 164 | 1.69 (0.89) | 202 | 1.75 (0.92) | 0.13 [−0.01, 0.28] | 0.148 | 0.074 |
| 6-month follow-up | 153 | 1.73 (0.92) | 179 | 1.75 (0.88) | 0.09 [−0.10, 0.28] | 0.102 | 0.338 |
| 12-month follow-up | 149 | 1.59 (0.81) | 193 | 1.67 (0.87) | 0.20 [0.00, 0.40] | 0.227 | 0.049 |
| Drive to increase muscularity | | | | | | | |
| Baseline | 162 | 11.90 (5.65) | 217 | 11.11 (5.42) | | | |
| Post-intervention | 164 | 10.96 (5.87) | 202 | 10.79 (5.50) | 0.72 [−0.19, 1.64] | 0.130 | 0.122 |
| 6-month follow-up | 153 | 11.23 (5.89) | 179 | 11.12 (5.17) | 0.91 [−0.24, 2.06] | 0.165 | 0.123 |
| 12-month follow-up | 150 | 10.93 (6.03) | 192 | 11.08 (5.06) | 1.61 [0.41, 2.81] | 0.292 | 0.008 |

**Table 5.** *Cont.*

| Outcome | n | Study Group Control M (SD) | n | Intervention M (SD) | Difference in Change Score (Group 1—Group 0) M (95% CI) | Effect Size | p (Two-Tailed) |
|---|---|---|---|---|---|---|---|
| Self-esteem | | | | | | | |
| Baseline | 160 | 11.74 (2.79) | 213 | 11.06 (2.65) | | | |
| Post-intervention | 162 | 11.85 (2.77) | 198 | 11.10 (2.77) | 0.06 [−0.47, 0.59] | 0.022 | 0.821 |
| 6-month follow-up | 153 | 11.13 (3.01) | 175 | 11.26 (3.02) | 0.78 [0.17, 1.39] | 0.288 | 0.012 |
| 12-month follow-up | 146 | 11.46 (3.13) | 191 | 11.02 (3.00) | 0.38 [−0.27, 1.03] | 0.140 | 0.254 |
| Depressive symptoms | | | | | | | |
| Baseline | 159 | 14.65 (6.47) | 214 | 14.78 (6.36) | | | |
| Post-intervention | 164 | 15.10 (7.64) | 202 | 15.42 (7.50) | 0.08 [−1.31, 1.47] | 0.012 | 0.910 |
| 6-month follow-up | 153 | 14.86 (7.23) | 177 | 14.95 (7.17) | 0.17 [−1.21, 1.56] | 0.027 | 0.807 |
| 12-month follow-up | 147 | 15.40 (7.60) | 190 | 16.62 (7.64) | 1.31 [-.21, 2.82] | 0.204 | 0.091 |
| **Exploratory outcomes** | | | | | | | |
| Thin ideal internalization | | | | | | | |
| Baseline | 162 | 10.50 (4.77) | 218 | 11.14 (4.60) | | | |
| Post-intervention | 163 | 11.04 (4.58) | 203 | 11.44 (4.53) | −0.09 [−0.97, 0.79] | −0.019 | 0.843 |
| 6-month follow-up | 152 | 11.65 (4.81) | 179 | 11.07 (4.47) | −0.79 [−1.77, 0.18] | −0.169 | 0.112 |
| 12-month follow-up | 149 | 10.93 (4.84) | 191 | 11.69 (4.58) | 0.37 [−0.64, 1.39] | 0.079 | 0.469 |
| Muscular internalization | | | | | | | |
| Baseline | 162 | 12.69 (5.81) | 218 | 12.11 (5.48) | | | |
| Post-intervention | 165 | 12.11 (6.16) | 204 | 11.89 (5.60) | 0.21 [−0.79, 1.21] | 0.037 | 0.682 |
| 6-month follow-up | 153 | 12.61 (6.19) | 179 | 12.58 (5.79) | 0.53 [−0.62, 1.69] | 0.094 | 0.363 |
| 12-month follow-up | 149 | 12.00 (6.31) | 191 | 12.60 (5.79) | 1.34 [.08, 2.60] | 0.238 | 0.037 |
| Upwards appearance comparison | | | | | | | |
| Baseline | 162 | 9.27 (5.42) | 214 | 9.60 (5.52) | | | |
| Post-intervention | 164 | 9.55 (5.81) | 204 | 10.22 (5.63) | 0.56 [−0.46, 1.59] | 0.102 | 0.281 |
| 6-month follow-up | 153 | 10.31 (6.02) | 178 | 9.89 (5.71) | −0.24 [−1.31, 0.83] | −0.044 | 0.664 |
| 12-month follow-up | 149 | 9.87 (5.81) | 191 | 10.18 (5.71) | 0.37 [−0.80, 1.55] | 0.068 | 0.531 |

Effects are based on multiple imputations (*n* = 50 imputations). Differences compare post-intervention to all other timepoints, adjusted for age, language, and school type.

## 4. Discussion

The present study evaluated the efficacy of a social media literacy intervention (SoMe) in bringing about positive change in adolescents' body image, body change strategies, and wellbeing. Contrary to our hypotheses, for the total sample, the intervention was not associated with improvements in body dissatisfaction, dietary restraint, self-esteem, depressive symptoms, internalization, or comparisons relative to the control group. The only difference to emerge in the full and completers sample was for drive for muscularity, whereby weaker declines were found in the intervention group relative to the control group. While the intervention showed benefits for girls in terms of dietary restraint and depressive symptoms at 6-month follow-up relative to controls, it appeared less effective among boys.

The findings indicate only minor intervention effects within the full group and among completers. These findings are somewhat consistent with those of previous research, which found improvements across a small number of outcomes [53,55]. These small effects may be attributable to a number of factors. First, although the intervention has theoretical grounding, was developed by a team with recognized expertise in the field, and included input from teachers, participants may have had difficulty in translating the skills imparted in the intervention. It is possible that the participants (aged 12–13 years) may have struggled with critical thinking skills and their ability to apply the intervention concepts to real life. If so, additional work may be needed to support adolescents to build and apply these skills over time. Alternatively, targeting interventions among older adolescents may be appropriate as they may be more capable of critical thinking skills. In regards to intervention delivery, all facilitators received training and used an intervention manual to present the lessons. Despite this, it is possible that the content and messages within the intervention were not delivered effectively. Perhaps external facilitators are not as effective at delivering this type of content to adolescents, in which case research should explore the effectiveness of delivery by class teachers. The established relationship between teachers and students may make adolescents more receptive to content and the regular classroom teachers will be familiar with the specific needs of students and, therefore, more likely to deliver the content in a way that resonates with students.

Participant engagement, motivation, and initiative to change may have been low in the present sample, resulting in fewer intervention effects. Given the pervasiveness of social media and how engrained it is in the lives of adolescents, it is likely that adolescents may demonstrate some resistance, or not be motivated, to changing their social media habits. Relatedly, scholars have begun to question whether traditional approaches within media literacy interventions can mitigate against social media effects on body dissatisfaction [72]. Shuilleabhain and colleagues suggest, for example, that while young people may demonstrate an awareness that social media images are edited, this does not necessarily mean that they are able to or have a want to disengage from the desire to achieve such appearances. This suggestion is supported by findings from experimental work showing that despite being able to recognize social media images as edited, adolescent girls rate manipulated images as highly attractive [36]. Shuilleabhain and colleagues argue that media literacy interventions should move beyond rationalistic approaches, where the onus is on the individual to separate social media from the self, to embodied, affective processes, which consider the relational experience of social media and its interconnectedness with the self among young people. Additional theoretical and empirical research is necessary to explore this concept further.

Furthermore, a number of considerations related to the nature and power of social media platforms themselves should be considered and contrasted with the intervention dose. As articulated above, social media platforms can be viewed as combining peer and traditional media influences. They are also extremely attractive to youth, who are motivated to engage with them for a host of reasons, including communicating with their friends, but also entertainment, social capital, and identity development [73]. These underlying motivations constitute powerful influences on the ways in which youth engage with social media. In addition, social media platforms are profit-driven industries, so much effort is invested into designing experiences that are appealing and promote the consumption of content. Relatedly, social media has been described as difficult to disengage from, reflecting the potency of the algorithms and the functionalities that engage users [74]. Finally, while this intervention was delivered at the classroom level, participants likely interact with other social groups on social media and would therefore likely continue to experience pressure to engage in their habitual social media practices. Faced with these powerful combinations of factors promoting engagement with social media in ways that are at odds with the tenets of social media literacy, it may be that a larger intervention dose is necessary to achieve the intended effects.

When the intervention effects were examined among girls, participants in the intervention group reported a reduction in dietary restraint at 6-month follow-up, whereas the control condition indicated increased dietary restraint. Further, increases in depressive symptoms among girls at 6-month follow-up were less pronounced for participants in the intervention relative to control condition. These findings suggest that the intervention is somewhat beneficial for girls. A reduction in dietary restraint is especially promising given that dieting behaviors are one of the most established risk factors for eating disorder onset [4]. However, both intervention effects were only evident from baseline to 6-month follow-up indicating that effects were not maintained at 12-month follow-up. One option to maintain intervention effects over time could be to provide booster sessions. In addition, although the present study used trained facilitators, interventions that train teachers to deliver this content may produce longer lasting effects given the continued interaction between teachers and students.

For boys, a number of effects were found, with mixed findings. First, although the sample reported overall reductions in dietary restraint from baseline to 12-month follow-up, declines were weaker in the intervention group relative to control. Further, the intervention group demonstrated increased self-esteem and drive for muscularity from baseline to 6-months and 12-month follow-up, respectively, while the control group declined. Although increased self-esteem is a promising outcome of the intervention, increased drive for muscularity is not. It is possible that presenting examples of muscular appearances within

the intervention may have inadvertently promoted upward comparisons with these images. However, given that such content is widespread in society, including on social media [75], it is unlikely that this would have had a considerable effect. The present study is the first that the authors are aware of that examined the efficacy of a school-based social media literacy intervention specific to eating behaviors among boys, so additional research is required.

The intervention appears to be slightly more efficacious among girls compared to boys. Social media literacy has been found to be protective against body dissatisfaction among young women but not men [54], so it is possible that interventions designed to enhance social media literacy will be less effective among boys. In line with the present study, eating disorder prevention interventions are more beneficial for girls than boys [18]. Girls engage in more appearance-focused social media use behaviors [76] and report poorer body image outcomes [6] than boys, so the present intervention may have been of greater relevance to girls suggesting the need for more research to explore options to enhance the effectiveness of social media literacy interventions to improve body image-related outcomes among boys.

The present study has a number of strengths, including the randomized controlled trial design, a diverse sample of adolescents from a range of school demographics (including both state and private secondary schools), and a longer follow-up period than previous social media literacy interventions. However, there were some limitations to acknowledge. First, sample attrition was high at approximately 30% at 12-month follow-up. However, the analyses on the full sample and completers showed the same pattern of results. Second, although the present study extended previous research by using longer follow-up periods (i.e., 6- and 12-months), future research would benefit from follow-up beyond 1 year.

The present study found modest support for SoMe in reducing dietary restraint and improving wellbeing in early adolescents and provides some evidence of the usefulness of a universal in-class intervention. Although the effects were small, this is not unexpected in the context of a universal intervention [40]. Given the far-reaching negative impacts of social media use among adolescents, even small effects may have scalable benefits. Furthermore, although clinical eating disorders affect all genders, they continue to have a higher prevalence among girls [6], so the fact that SoMe was successful in reducing dieting among girls, albeit with a small effect, is therefore noteworthy.

These findings suggest a number of important directions for future research. The first is the extension of the work and efforts to identity for whom the intervention may be most useful by exploring individual moderating factors. Relatedly, decision tree analyses could be explored to identify subgroups within the sample who benefitted substantially from the intervention. Findings from such work will further inform the cost-benefit ratio of a universal prevention approach to the reduction of body image and eating concerns through social media literacy. In addition, future research should aim to identify ways to increase the intervention dose and potentialize intervention effects. As mentioned above, booster sessions, or further integration of the content into existing curriculums might achieve this. Further, it could be fruitful to pair educational-style interventions with technology-based interruptions such that youth are further nudged when using social media [77]. Finally, considering how to incorporate perceptions of peer norms into the intervention to decrease potential concerns regarding the negative impacts on social relationships of implementing the strategies included in the intervention may be useful [78].

As parents and educators continue to call for social media literacy resources to address its impact on body image, dieting, and wellbeing (and indeed introduce programs that have not been evaluated and may have unidentified risks), it is essential to find evidence-based strategies that are effective. Thus, more work is needed to address this. Further, given rates of social media use among adolescents have increased during the COVID-19 pandemic [79], there is urgency in conducting this research and providing evidence-based interventions.

## 5. Conclusions

Demand for social media body image interventions for adolescents is high. The present study tested a new school-based social media literacy intervention, aiming to fill the gap in available universal resources for youth. Findings were overall modest in terms of intervention effects yet notable given the brief nature of the intervention and its universal nature. Specifically, findings among girls indicated that the intervention was valuable in addressing dietary restraint and depressive symptoms at the 6-month follow-up. Fewer positive effects emerged among boys. Together, these findings provide preliminary support for school-based social media literacy interventions, particularly among adolescent girls.

## References

1. Smink, F.R.E.; van Hoeken, D.; Hoek, H.W. Epidemiology of eating disorders: Incidence, prevalence and mortality rates. *Curr. Psychiatry Rep.* **2012**, *14*, 406–414. [CrossRef]
2. Streatfeild, J.; Hickson, J.; Austin, S.B.; Hutcheson, R.; Ba, J.S.K.; Lampert, J.G.; Ma, E.M.M.; Richmond, T.K.; Samnaliev, M.; Velasquez, K.; et al. Social and economic cost of eating disorders in the United States: Evidence to inform policy action. *Int. J. Eat. Disord.* **2021**, *54*, 851–868. [CrossRef]
3. Galmiche, M.; Déchelotte, P.; Lambert, G.; Tavolacci, M.P. Prevalence of eating disorders over the 2000–2018 period: A systematic literature review. *Am. J. Clin. Nutr.* **2019**, *109*, 1402–1413. [CrossRef] [PubMed]
4. Stice, E.; Desjardins, C.D. Interactions between risk factors in the prediction of onset of eating disorders: Exploratory hypothesis generating analyses. *Behav. Res. Ther.* **2018**, *105*, 52–62. [CrossRef]
5. Carlisle, E.; Fildes, J.; Hall, S.; Perrens, B.; Perdriau, A.; Plummer, J. *Youth Survey Report*; Mission Australia: Sydney, NSW, Australia, 2019.
6. McLean, S.A.; Rodgers, R.F.; Slater, A.; Jarman, H.K.; Gordon, C.S.; Paxton, S.J. Clinically significant body dissatisfaction: Prevalence and association with depressive symptoms in adolescent boys and girls. *Eur. Child Adolesc. Psychiatry* **2021**, 1–12. [CrossRef]
7. Day, S.; Bussey, K.; Trompeter, N.; Hay, P.; Lonergan, A.; Mitchison, D. Associations of weight-or s hape-related bullying with diverse disordered eating behaviors in adolescents. *Int. J. Eat. Disord.* **2021**, *54*, 1641–1651. [CrossRef]
8. Griffiths, S.; Hay, P.; Mitchison, D.; Mond, J.; McLean, S.A.; Rodgers, B.; Massey, R.; Paxton, S. Sex differences in the relationships between body dissatisfaction, quality of life and psychological distress. *Aust. N. Z. J. Public Health* **2016**, *40*, 518–522. [CrossRef] [PubMed]
9. Lewis-Smith, H.; Bray, I.; Salmon, D.; Slater, A. Prospective pathways to depressive symptoms and disordered eating in adolescence: A 7-year longitudinal cohort study. *J. Youth Adolesc.* **2020**, *49*, 2060–2074. [CrossRef]
10. Paxton, S.J.; Neumark-Sztainer, D.; Hannan, P.J.; Eisenberg, M.E. Body dissatisfaction prospectively predicts depressive mood and low self-esteem in adolescent girls and boys. *J. Clin. Child Adolesc. Psychol.* **2006**, *35*, 539–549. [CrossRef] [PubMed]

11. Choi, E.; Choi, I. The associations between body dissatisfaction, body figure, self-esteem, and depressed mood in adolescents in the United States and Korea: A moderated mediation analysis. *J. Adolesc.* **2016**, *53*, 249–259. [CrossRef]

12. Goldschmidt, A.B.; Wall, M.M.; Loth, K.A.; Neumark-Sztainer, D. Risk factors for disordered eating in overweight adolescents and young adults. *J. Pediatr. Psychol.* **2015**, *40*, 1048–1055. [CrossRef] [PubMed]

13. Sharpe, H.; Griffiths, S.; Choo, T.-H.; Eisenberg, M.E.; Mitchison, D.; Wall, M.; Neumark-Sztainer, D. The relative importance of dissatisfaction, overvaluation and preoccupation with weight and shape for predicting onset of disordered eating behaviors and depressive symptoms over 15 years. *Int. J. Eat. Disord.* **2018**, *51*, 1168–1175. [CrossRef] [PubMed]

14. Bornioli, A.; Lewis-Smith, H.; Smith, A.; Slater, A.; Bray, I. Adolescent body dissatisfaction and disordered eating: Predictors of later risky health behaviours. *Soc. Sci. Med.* **2019**, *238*, 112458. [CrossRef] [PubMed]

15. Neumark-Sztainer, D.; Paxton, S.; Hannan, P.J.; Haines, J.; Story, M. Does body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males. *J. Adolesc. Health* **2006**, *39*, 244–251. [CrossRef]

16. Bucchianeri, M.M.; Neumark-Sztainer, D. Body dissatisfaction: An overlooked public health concern. *J. Public Ment. Health* **2014**, *13*, 64–69. [CrossRef]

17. Kusina, J.R.; Exline, J.J. Beyond body image: A systematic review of classroom-based interventions targeting body image of adolescents. *Adolesc. Res. Rev.* **2019**, *4*, 293–311. [CrossRef]

18. Chua, J.Y.X.; Tam, W.; Shorey, S. Research review: Effectiveness of universal eating disorder prevention interventions in improving body image among children: A systematic review and meta-analysis. *J. Child Psychol. Psychiatry* **2019**, *61*, 522–535. [CrossRef]

19. Thompson, J.K.; Heinberg, L.J.; Altabe, M.; Tantleff-Dunn, S. *Exacting Beauty: Theory, Assessment, and Treatment of Body Image Disturbance*; American Psychological Association (APA): Washington, DC, USA, 1999.

20. Dobson, S.; Beltman, M. Powerful and pervasive, or personal and positive: Views of young girls, parents and educators about media. *Issues Educ. Res.* **2019**, *91*, 38–54. [CrossRef]

21. Twenge, J.M.; Martin, G.N.; Spitzberg, B.H. Trends in U.S. adolescents' media use, 1976–2016: The rise of digital media, the decline of TV, and the (near) demise of print. *Psychol. Popul. Media Cult.* **2019**, *8*, 329–345. [CrossRef]

22. Obar, J.A.; Wildman, S. Social media definition and the governance challenge: An introduction to the special issue. *Telecommun. Policy* **2015**, *39*, 745–750. [CrossRef]

23. Odgers, C.L.; Robb, M.B. *Tweens, Teens, Tech, and Mental Health: Coming of Age in an Increasingly Digital, Uncertain, and Unequal World*; Common Sense Media: San Francisco, CA, USA, 2020.

24. Vannucci, A.; Ohannessian, C.M. Social media use subgroups differentially predict psychosocial well-being during early adolescence. *J. Youth Adolesc.* **2019**, *48*, 1469–1493. [CrossRef]

25. Alberga, A.S.; Withnell, S.J.; von Ranson, K.M. Fitspiration and thinspiration: A comparison across three social networking sites. *J. Eat. Disord.* **2018**, *6*, 39. [CrossRef] [PubMed]

26. Vogel, E.A.; Rose, J.P. Self-reflection and interpersonal connection: Making the most of self-presentation on social media. *Transl. Issues Psychol. Sci.* **2016**, *2*, 294–302. [CrossRef]

27. Burnette, C.B.; Kwitowski, M.A.; Mazzeo, S.E. "I don't need people to tell me I'm pretty on social media:" A qualitative study of social media and body image in early adolescent girls. *Body Image* **2017**, *23*, 114–125. [CrossRef] [PubMed]

28. Niu, G.; Sun, L.; Liu, Q.; Chai, H.; Sun, X.; Zhou, Z. Selfie-posting and young adult women's restrained eating: The role of commentary on appearance and self-objectification. *Sex Roles* **2019**, *82*, 232–240. [CrossRef]

29. Fardouly, J.; Pinkus, R.T.; Vartanian, L.R. The impact of appearance comparisons made through social media, traditional media, and in person in women's everyday lives. *Body Image* **2017**, *20*, 31–39. [CrossRef]

30. Holland, G.; Tiggemann, M. A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes. *Body Image* **2016**, *17*, 100–110. [CrossRef]

31. Saiphoo, A.N.; Vahedi, Z. A meta-analytic review of the relationship between social media use and body image disturbance. *Comput. Hum. Behav.* **2019**, *101*, 259–275. [CrossRef]

32. Ryding, F.C.; Kuss, D.J. The use of social networking sites, body image dissatisfaction, and body dysmorphic disorder: A systematic review of psychological research. *Psychol. Popul. Media Cult.* **2020**, *9*, 412–435. [CrossRef]

33. De Vries, D.; Peter, J.; de Graaf, H.; Nikken, P. Adolescents' social network site use, peer appearance-related feedback, and body dissatisfaction: Testing a mediation model. *J. Youth Adolesc.* **2015**, *45*, 211–224. [CrossRef] [PubMed]

34. Rousseau, A.; Eggermont, S.; Frison, E. The reciprocal and indirect relationships between passive Facebook use, comparison on Facebook, and adolescents' body dissatisfaction. *Comput. Hum. Behav.* **2017**, *73*, 336–344. [CrossRef]

35. Jarman, H.K.; McLean, S.A.; Slater, A.; Marques, M.D.; Paxton, S.J. Direct and indirect relationships between social media use and body satisfaction: A prospective study among adolescent boys and girls. *New Media Soc.* **2021**, in press. [CrossRef]

36. Kleemans, M.; Daalmans, S.; Carbaat, I.; Anschütz, D. Picture perfect: The direct effect of manipulated Instagram photos on body image in adolescent girls. *Media Psychol.* **2018**, *21*, 93–110. [CrossRef]

37. Yee, Z.W.; Griffiths, S.; Fuller-Tyszkiewicz, M.; Blake, K.; Richardson, B.; Krug, I. The differential impact of viewing fitspiration and thinspiration images on men's body image concerns: An experimental ecological momentary assessment study. *Body Image* **2020**, *35*, 96–107. [CrossRef] [PubMed]

38. Mills, J.S.; Musto, S.; Williams, L.; Tiggemann, M. "Selfie" harm: Effects on mood and body image in young women. *Body Image* **2018**, *27*, 86–92. [CrossRef] [PubMed]

39. Pulimeno, M.; Piscitelli, P.; Colazzo, S.; Colao, A.; Miani, A. School as ideal setting to promote health and wellbeing among young people. *Health Promot. Perspect.* **2020**, *10*, 316–324. [CrossRef] [PubMed]

40. Yager, Z.; Diedrichs, P.; Ricciardelli, L.; Halliwell, E. What works in secondary schools? A systematic review of classroom-based body image programs. *Body Image* **2013**, *10*, 271–281. [CrossRef]

41. Verrastro, V.; Fontanesi, L.; Liga, F.; Cuzzocrea, F.; Gugliandolo, M.C. Fear the Instagram: Beauty stereotypes, body image and Instagram use in a sample of male and female adolescents. *Qwerty—Open Interdiscip. J. Technol. Cult. Educ.* **2020**, *15*, 31–49. [CrossRef]

42. Jarman, H.K.; Marques, M.D.; McLean, S.A.; Slater, A.; Paxton, S.J. Social media, body satisfaction and well-being among adolescents: A mediation model of appearance-ideal internalization and comparison. *Body Image* **2021**, *36*, 139–148. [CrossRef]

43. Levin-Zamir, D.; Bertschi, I. Media health literacy, eHealth literacy, and the role of the social environment in context. *Int. J. Environ. Res. Public Health* **2018**, *15*, 1643. [CrossRef]

44. Irving, L.M.; DuPen, J.; Berel, S. A media literacy program for high school females. *Eat. Disord.* **1998**, *6*, 119–131. [CrossRef]

45. Wilksch, S.M.; Wade, T.D. Media literacy in the prevention of eating disorders. In *The Wiley Blackwell Handbook of Eating Disorders*; Smolak, L., Levine, M.P., Eds.; Ch45; Wiley-Blackwell: New York, NY, USA, 2015; pp. 610–624.

46. McLean, S.A.; Paxton, S.J.; Wertheim, E.H. The role of media literacy in body dissatisfaction and disordered eating: A systematic review. *Body Image* **2016**, *19*, 9–23. [CrossRef] [PubMed]

47. Wade, T.D.; Wilksch, S.M.; Paxton, S.J.; Byrne, S.M.; Austin, S.B. Do universal media literacy programs have an effect on weight and shape concern by influencing media internalization? *Int. J. Eat. Disord.* **2017**, *50*, 731–738. [CrossRef] [PubMed]

48. Zuair, A.A.; Sopory, P. Effects of media health literacy school-based interventions on adolescents' body image concerns, eating concerns, and thin-internalization attitudes: A systematic review and meta-analysis. *Health Commun.* **2020**, 1–9. [CrossRef] [PubMed]

49. Lee, G.Y.; Park, E.J.; Kim, Y.-R.; Kwag, K.H.; Park, J.H.; An, S.H.; Lee, J.H.; Sim, J.H.; Treasure, J. Feasibility and acceptability of a prevention program for eating disorders (Me, You and Us) adapted for young adolescents in Korea. *Eat. Weight Disord.—Stud. Anorex. Bulim. Obes.* **2017**, *23*, 673–683. [CrossRef] [PubMed]

50. Dunstan, C.J.; Paxton, S.J.; McLean, S.A. An evaluation of a body image intervention in adolescent girls delivered in single-sex versus co-educational classroom settings. *Eat. Behav.* **2017**, *25*, 23–31. [CrossRef] [PubMed]

51. Sharpe, H.; Schober, I.; Treasure, J.; Schmidt, U. Feasibility, acceptability and efficacy of a school-based prevention programme for eating disorders: Cluster randomised controlled trial. *Br. J. Psychiatry* **2013**, *203*, 428–435. [CrossRef]

52. Espinoza, P.; Penelo, E.; Raich, R.M. Prevention programme for eating disturbances in adolescents. Is their effect on body image maintained at 30 months later? *Body Image* **2013**, *10*, 175–181. [CrossRef] [PubMed]

53. McLean, S.A.; Wertheim, E.H.; Masters, J.; Paxton, S. A pilot evaluation of a social media literacy intervention to reduce risk factors for eating disorders. *Int. J. Eat. Disord.* **2017**, *50*, 847–851. [CrossRef]

54. Tamplin, N.C.; McLean, S.A.; Paxton, S.J. Social media literacy protects against the negative impact of exposure to appearance ideal social media images in young adult women but not men. *Body Image* **2018**, *26*, 29–37. [CrossRef]

55. Bell, B.T.; Taylor, C.; Paddock, D.; Bates, A. Digital bodies: A controlled evaluation of a brief classroom-based intervention for reducing negative body image among adolescents in the digital age. *Br. J. Educ. Psychol.* **2021**, e12449. [CrossRef]

56. Gordon, C.; Rodgers, R.F.; Slater, A.E.; McLean, S.A.; Jarman, H.; Paxton, S.J. A cluster randomized controlled trial of the SoMe social media literacy body image and wellbeing program for adolescent boys and girls: Study protocol. *Body Image* **2020**, *33*, 27–37. [CrossRef]

57. Australian Bureau of Statistics Census of Population and Housing. Socio-Economic Indexes for Areas (SEIFA). 2016. Available online: https://www.abs.gov.au/ausstats/abs@.nsf/mf/2033.0.55.001 (accessed on 15 September 2021).

58. Jacobi, C.; Hayward, C.; de Zwaan, M.; Kraemer, H.C.; Agras, S. Coming to terms with risk factors for eating disorders: Application of risk terminology and suggestions for a general taxonomy. *Psychol. Bull.* **2004**, *130*, 19–65. [CrossRef]

59. Thoman, E.; Jolls, T. Media literacy education: Lessons from the center for media literacy. In *Media Literacy: Transforming Curriculum and Teaching*; Schwarz, G., Brown, P.U., Eds.; Blackwell Publishers: Chicago, IL, USA, 2005; pp. 180–205.

60. Grace, D.J.; Henward, A.S. Investigating young children's talk about the media. *Contemp. Issues Early Child.* **2013**, *14*, 138–154. [CrossRef]

61. Fairburn, C.G.; Beglin, S.J. Assessment of eating disorders: Interview or self-report questionnaire? *Int. J. Eat. Disord.* **1994**, *16*, 363–370. [PubMed]

62. Durkin, S.J.; Paxton, S.J. Predictors of vulnerability to reduced body image satisfaction and psychological wellbeing in response to exposure to idealized female media images in adolescent girls. *J. Psychosom. Res.* **2002**, *53*, 995–1005. [CrossRef]

63. Van Strien, T.; Frijters, J.E.R.; Bergers, G.P.A.; Defares, P.B. The Dutch eating behavior questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *Int. J. Eat. Disord.* **1986**, *5*, 295–315. [CrossRef]

64. Ricciardelli, L.A.; McCabe, M. Psychometric evaluation of the body change inventory: An assessment instrument for adolescent boys and girls. *Eat. Behav.* **2002**, *3*, 45–59. [CrossRef]

65. Haroz, E.E.; Ybarra, M.L.; Eaton, W.W. Psychometric evaluation of a self-report scale to measure adolescent depression: The CESDR-10 in two national adolescent samples in the United States. *J. Affect. Disord.* **2014**, *158*, 154–160. [CrossRef] [PubMed]

66. Robins, R.W.; Hendin, H.M.; Trzesniewski, K.H. Measuring Global Self-Esteem: Construct Validation of a Single-Item Measure and the Rosenberg Self-Esteem Scale. *Personal. Soc. Psychol. Bull.* **2001**, *27*, 151–161. [CrossRef]

67. Rosenberg, M. *Society and the Adolescent Self-Image*; Princeton University Press: Princeton, NJ, USA, 1965.
68. Thompson, J.K.; van de Berg, P.; Roehrig, M.; Guarda, A.S.; Heinberg, L.J. The sociocultural attitudes towards appearance scale-3 (SATAQ-3): Development and validation. *Int. J. Eat. Disord.* **2004**, *35*, 293–304. [CrossRef] [PubMed]
69. Schaefer, L.M.; Harriger, J.; Heinberg, L.J.; Soderberg, T.; Thompson, J.K. Development and validation of the sociocultural attitudes towards appearance questionnaire-4-revised (SATAQ-4R). *Int. J. Eat. Disord.* **2017**, *50*, 104–117. [CrossRef] [PubMed]
70. O'Brien, K.S.; Caputi, P.; Minto, R.; Peoples, G.; Hooper, C.; Kell, S.; Sawley, E. Upward and downward physical appearance comparisons: Development of scales and examination of predictive qualities. *Body Image* **2009**, *6*, 201–206. [CrossRef] [PubMed]
71. Cohen, J. A power primer. *Psychol. Bull.* **1992**, *112*, 155–159. [CrossRef] [PubMed]
72. Shuilleabhain, N.; Rich, E.; Fullagar, S. Rethinking digital media literacy to address body dissatisfaction in schools: Lessons from feminist new materialisms. *New Media Soc.* **2021**, 1–9. [CrossRef]
73. Rodgers, R.F.; Mclean, S.A.; Gordon, C.S.; Slater, A.; Marques, M.D.; Jarman, H.K.; Paxton, S.J. Development and validation of the motivations for social media use scale (MSMU) among adolescents. *Adolesc. Res. Rev.* **2020**, *6*, 425–435. [CrossRef]
74. Montag, C.; Lachmann, B.; Herrlich, M.; Zweig, K. Addictive features of social media/messenger platforms and freemium games against the background of psychological and economic theories. *Int. J. Environ. Res. Public Health* **2019**, *16*, 2612. [CrossRef] [PubMed]
75. Carrotte, E.R.; Prichard, I.; Lim, M.S.C. "Fitspiration" on social media: A content analysis of gendered images. *J. Med. Internet Res.* **2017**, *19*, e95. [CrossRef]
76. Bell, B.T. "You take fifty photos, delete forty nine and use one": A qualitative study of adolescent image-sharing practices on social media. *Int. J. Child-Comput. Interact.* **2019**, *20*, 64–71. [CrossRef]
77. Purohit, A.K.; Barclay, L.; Holzer, A. Designing for digital detox: Making social media less addictive with digital nudges. In Proceedings of the Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems, Honolulu, HI, USA, 25–30 April 2020; pp. 1–9.
78. Cuijpers, P. Effective ingredients of school-based drug prevention programs: A systematic review. *Addict. Behav.* **2002**, *27*, 1009–1023. [CrossRef]
79. Paschke, K.; Austermann, M.I.; Simon-Kutscher, K.; Thomasius, R. Adolescent gaming and social media usage before and during the COVID-19 pandemic. *Sucht* **2021**, *67*, 13–22. [CrossRef]